

Host Specificity in *A. nudibasis* (Diptera : Tachinidae)

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ABSTRACT

A. nudibasis (Tachinidae:Diptera) is biocontrol agent of some lepidopterous insect pests. It attacked 3 lepidopteron pests namely *Helicoverpa armigera* Hubner, *Spodoptera litura* Fab. and *Spodoptera exigua* Hubner with 15.00%, 80.00% and 46.00% parasitism respectively. *Achea janata* L. and *Exelastis atomosa* Walsingham were found unattacked by present tachinid fly.

Key words: *A. nudibasis*, Host specificity, Biological pest control

INTRODUCTION

Host specificity studies are great concern to many researchers in entomophagous insects since they are used as biocontrol agents in pest management (Sathe, 2015). According to Salt (1937) host selection phenomenon by parasitoid consist of four distinct steps namely habitat selection, host location, host acceptance and host suitability. Host suitability is further dependant upon morphological and physiological adaptations both in hosts and parasitoids (Vinson, 1976).

A. nudibasis is a Tachinid biocontrol agent of many lepidopterous pest insects (Shendage & Sathe 2016). The apparent lability of host use among most Tachinidae may be due to a general lack of host specific adaptations relating to host physiological defences (Stireman *et al.*, 2006). Tachinids exploit a wide diversity of hosts belonging to many orders and families of insects. The strictest associations between tachinid and host groups are the restriction of Phasiinae to Heteroptera and Rutiliini to Scarab hosts. However, some broad parasitoid - host associations refer to Dexiini - Scarabaeidae, Tachininae - Lepidoptera, Exoristinae- Lepidoptera and Ormiini - Orthoptera.

order may have served as ancestral hosts of tachinids. Most tachinids attack exophytic caterpillars and other holometabolous larvae which have similarity with caterpillars such as sawflies and chrysomitids.

Host associations of tachinids are not strongly limited by physiological suitability or host defenses (Stireman *et al.*, 2006). The processes of host location and selection that determine proximate host use may ultimately shape broad - scale ecological and evolutionary patterns of host use. The mechanisms by which most tachinids locate and select hosts are not well understood. However, certain parasitoids are more amenable to laboratory production than others, their mass production is simplified on factitious hosts and can be commercialized on large scale for pest management.

In past, Beeson & Chattarjee (1935), Eggleton & Gaston (1992), Narayanswamy *et al.*, (1993), Sathe & Jadhav (2001), Jadhav & Sathe (2016) etc. attempted studies pertaining to host parasitoid specificity in dipterous parasitoids.

MATERIAL AND METHODS

Laboratory cultures of host and parasitoid were used in the present experiments. Each experiment was replicated for five times. *S. litura*, *S. exigua*, *H. armigera*, *A. janata* and *E. atomosa* larvae of host density 20 of known age 8 days were exposed to parasitoid *A. nudibasis* for 24 hours in glass cages for parasitization. After oviposition by parasitoid, the parasitized larvae were reared separately in plastic containers for parasitoid/moth emergence. Later, per cent parasitism was calculated. During the experiments parasitoids fed with 50% honey and host larvae with mulberry leaves, except *A. janata* on castor leaves and *E. atomosa* on pigeon pea leaves.

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The wide spread use of Lepidoptera in Exoristinae, Tachininae and Dexiinae suggests that members of this

RESULTS

Results are recorded in [table-1](#) and [figs 1-2](#)

Table-1. Host specificity in *A. nudibasis*

Sr. No	Host species exposed	Host density exposed	Parasitoid emerged	moths emerged	% parasitism
1	<i>S. litura</i>	10	40	1	80.00
2	<i>S. exigua</i>	10	23	5	46.00
3	<i>H. armigera</i>	10	05	9	15.00
4	<i>A. janata</i>	10	0.0	10	0.00
5	<i>E. atomosa</i>	10	0.0	0.0	0.00

Figure-2. *A. nudibasis* adult



Figure-3. *H. armigera* attacking pigeon pea



Out of 5 hosts exposed to parasitoid ([table-1](#)), 3 hosts were accepted for parasitization. The host species *A. janata* and *E. atomosa* remain unparasitized. Highest parasitoid emergence (40) was noted with *S. litura* larvae with 80% parasitism which is followed by *S. exigua* (23) and *H. armigera* (5) with 46.00% and 15.00% parasitism respectively. The results indicated that most suitable host for maximum progeny production was *S. litura*.

DISCUSSION

According to Eggleton & Gaston (1992) the set of host tachinids attack may be more closely related to their ecology than to their phylogenetic affinities. While, Stireman *et al.*, (2006) says that host range is not strongly conserved and not closely related to oviposition strategies or other major traits that define clades within Tachinidae. In the present work, *S. litura* was attacked by *A. nudobasis* as this pest species is polyphagous and found in various agro and forest ecosystems. While, *H. armigera*, although it found in various agro and forest ecosystems, attacked by less number of parasitoids (only one in present study) indicating that the host has developed strong defense against present tachinid. Like wise *A. janata* and *E. atomosa* were also not attacked by the present parasitoid, indicating its strong defences may be morphological or physiological, needs to investigate the aspects as further avenue for research in entomophagae.

Eleven host larval species have been tried against *Exorista bombycis* Louis for their parasitization by Narayanswamy *et al.*, (1993). Their results indicated that the parasitoid preferred *Bombyx mori* L. with 54.52%, *Samia cynthia ricini* Boisduval 13.22%, *Antheraea mylitta* D. 10.00%, *S. litura* 8.9%, *H. armigera* 7.41%, *A. janata* 5.16% and *Adisura atkinsoni* Moore 0.86%. While, *Spilosoma oblique* (Walker) *Euproctis fraterna*, M., *Eupterote mollifera* W. and *Attera fabricialla* remain unattacked. They concluded that texture of the skin, physical obstructions and body size of hosts influenced the rate of oviposition by parasitoid.

According to Beeson & Chattarjee (1935) *T. bombycis* attack several lepidopterous hosts which includes *Acherontia lachesis* F., *A. ricini*, *B. mori*, *Andraca bipunctata* Walker, *Dasychira mendosa* Hubner, *D. thwaitesti* Moore, *Thiocidas postica* Walker and *Metanastris hyrtaca* Cameron. *Campoletis chlorideae* Uchida (Ichneumonidae : Hymenoptera) attacked 3 hosts from lepidoptera namely *H. armigera*, *S. litura* & *S. exigua* (Sathe & Santhakumar, 1992).

Crosshey (1977) has given host parasitoid index of Tachinids from oriental region. *Tachina sorbillans* was studied with respect to specificity by Isarangkul *et al.*, (1972) from Bangladesh. *A. janata* and *Prodinia litura* Fab. were important hosts they reported. While, Sabrosky & Reardon (1976) reported *Lymantria disper* L. as new host to *T. sorbillans*. Similarly Siddappajii & Jamil (1992) and Thomson separately recorded 44 host species for uzifly. However, supplementary hosts are essential in mass rearing of parasitoids.

Recently, host preference by uzifly *E. bomycis* to pureline bivoltine breeds Fc_1 and Fc_2 (*B. mori*) have been studied by Jadhav & Sathe (2016). Their results indicated that Fc_1 produced more yield and was less susceptible to uzifly attack (10%), while Fc_2 was more susceptible to attack (30%) and found reducing the yield of cocoons. In general tachinid flies are good biocontrol agents of

various lepidopterous pests. Hence, the present work has special importance in biological pest control programme.

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Conflicts of Interest

Authors declare that there is no conflict of interests regarding the publication of this paper.

References

- [1]. Beeson C.F.C. and Chatterjee S.N. The biology of Tachinidae (Diptera). *Indian Forest Records*, 1, 184 (1935).
- [2]. Crosskey, R.W. Tachinidae. In - A catalogue the Diptera of the oriental region (MDDI & DEH eds.) The Uni. press Hawaii Honculu, 35, 86-97 (1977).
- [3]. Eggleton P., Gaston K.J. Tachinid host ranges : a reappraisal (Diptera : Tachinidae). *Entomol. Gaz.*, 43 : 139-43 (1992).
- [4]. Jadhav A.D. & T.V. Sathe Host preference by uzifly *Exorism bombycis* L. in pureline bivoltine breeds Fc_1 & Fc_2 (*Bombyx mori* L.) and economical loss in seed cocoon production. *Biolife*, 4(1), 88-93 (2016).
- [5]. Sabrosky, C.W. & Reardon R.C. Tachinid parasites of the Gypsy moth *Lymantria dispar* L. with key to adults and puparia. *Ent. Soc. Am.*, 10, 55-57 (1976).
- [6]. Salt, G. Experimental studies in insect parasitization V. The sense used by *Trichogramma* distinguish between parasitized and non-parasitized host. *Proc. Roy. Soc. London (B)*, 122, 57-75 (1937).
- [7]. Sathe T.V. Biological control through Ichneumonids. Astral. Int. Nat. Pvt. Ltd., New Delhi pp. 1-117 (2015).
- [8]. Sathe, T.V. & A.D. Jadhav Sericulture & pest management. Daya Publ. House, New Delhi pp. 1-197 (2001).
- [9]. Swapna Gurrapu and Estari Mamidala. In vitro HIV-Reverse Transcriptase Inhibition of Andrographolide Isolated from Andrographis Paniculata. *European Journal of Biomedical and Pharmaceutical Sciences*. 2017. Volume 4, Issue 12. 516-522.
- [10]. Sathe, T.V. & M.V. Santhakumar Host specificity in *Campoletis chlorideae* (Uhida) (Ichneumonidae : Hymenoptera). *J. Adv. Zool.*, 13 (1+2) 53-56 (1992).
- [11]. Shendage N.N. & T.V. Sathe Tachinids as good biocontrol agents of agricultural pests. *Biolife*. 4(1), 79-83 (2016).
- [12]. Siddappaji C., & Jamil, K. Host range of the Indian uzifly, *Exorista bombycis*. *Nat. Sem. uzifly & control*, KSSDI, Bangalore p. 11 (1992).
- [13]. Stireman, John O. III, Ohara, J.E. and Wood D.M. Tachinidae : Evolution, behaviour and ecology. *Ann. Rev. Ent.*, 51, 525-555 (2006).
- [14]. Vinson, S.B. Host selection by insect parasitoids. *Ann. Rev. Ent.*, 21, 109-134 (1976).